

Having described the invention, the following is claimed:

1. A vehicle component comprising a biodegradable material, said biodegradable material including a polyhydroxyalkanoate resin.

2. The vehicle component of claim 1 wherein the polyhydroxyalkanoate resin is a homo-polymer or copolymer of hydroxyalkanoate monomer units selected from the group consisting of 3-hydroxybutyrate, 3-hydroxyvalerate, 3-hydroxyoctanoate, 4-hydroxybutyrate, 5 5-hydroxyvalerate, 5-hydroxycaproate, 6-hydroxycaproate, 6-hydroxycaprylate, and 6-hydroxypropionate.

3. The vehicle component of claim 1 wherein the vehicle component is made from a composite, the composite comprising a continuous matrix of the polyhydroxyalkanoate resin reinforced with a biodegradable fiber.

4. The vehicle occupant component of claim 3 wherein the biodegradable fiber comprises a continuous fiber or a discontinuous fiber.

5. The vehicle component of claim 3 wherein the biodegradable fiber comprises one of a plurality of continuous fibers and the continuous fibers are woven together.

6. The vehicle component of claim 3 wherein the biodegradable fiber comprises one of a plurality of discontinuous fibers and the discontinuous fibers are bonded together to form a web.

7. The vehicle component of claim 3 wherein the biodegradable fiber is a natural fiber or synthetic fiber.

8. The vehicle component of claim 3 wherein the polyhydroxyalkanoate resin is a poly(3-hydroxybutyrate).

9. The vehicle component of claim 3 wherein the biodegradable fiber is cotton.

10. The vehicle component of claim 1 wherein the polyhydroxyalkanoate resin is in the form of polyhydroxyalkanoate fibers.

11. The vehicle component of claim 10 wherein the polyhydroxyalkanoate fibers are woven or bonded together to form a biodegradable fabric.

12. The vehicle component of claim 10 wherein the polyhydroxyalkanoate resin is selected from group consisting of poly(3-hydroxybutyrate-co-3-hydroxyvalerate) polyhydroxyoctanoate.

13. The vehicle component of claim 1 wherein the biodegradable material is a biodegradable cellular material.

14. The vehicle component of claim 1 wherein the biodegradable material further comprises a filler material.

15. The vehicle component of claim 14 wherein the filler material imparts sound deadening properties to the biodegradable material.

16. The vehicle component of claim 14 wherein the filler material is a naturally occurring mineral.

17. A vehicle occupant protection apparatus comprising:

a reaction canister; and

an inflatable vehicle occupant protection device contained in the reaction canister;

wherein at least one of the reaction canister and the inflatable vehicle occupant protection device is biodegradable and comprises a polyhydroxyalkanoate resin.

18. The vehicle occupant protection apparatus of claim 17 wherein the polyhydroxyalkanoate resin is a homopolymer or copolymer of hydroxyalkanoate monomer units selected from the group consisting of 3-hydroxybutyrate, 3-hydroxyvalerate, 3-hydroxyoctanoate, 4-hydroxybutyrate, 5 5-hydroxyvalerate, 5-hydroxycaproate, 6-hydroxycaproate, 6-hydroxycaprylate, and 6-hydroxypropionate.

19. The vehicle occupant protection apparatus of claim 17 wherein the reaction canister is biodegradable and comprises a polyhydroxyalkanoate resin.

20. The vehicle occupant protection apparatus of claim 19 wherein the reaction canister is made from a composite, the composite comprising a continuous matrix of the polyhydroxyalkanoate resin reinforced with a biodegradable fiber.

21. The vehicle occupant protection apparatus of claim 20 wherein the biodegradable fiber comprises a continuous fiber or a discontinuous fiber.

22. The vehicle occupant protection apparatus of claim 20 wherein the biodegradable fiber comprises one of a plurality of continuous fibers and the continuous fibers are woven together.

23. The vehicle occupant protection apparatus of claim 20 wherein the biodegradable fiber comprises one of a plurality of discontinuous fibers and the discontinuous fibers are bonded together to form a web.

24. The vehicle occupant protection apparatus of claim 20 wherein the biodegradable fiber is a natural fiber or synthetic fiber.

25. The vehicle occupant apparatus of claim 20 wherein the polyhydroxyalkanoate resin is a poly(3-hydroxybutyrate).

26. The vehicle occupant apparatus of claim 25 wherein the biodegradable fiber is cotton.

27. The vehicle occupant apparatus of claim 17 wherein the air bag is biodegradable and comprises polyhydroxyalkanoate resin.

28. The vehicle occupant protection apparatus of claim 27 wherein the polyhydroxyalkanoate resin is in the form of polyhydroxyalkanoate fibers.

29. The vehicle occupant protection apparatus of claim 28 wherein the polyhydroxyalkanoate fibers are woven or bonded together to form a biodegradable fabric.

30. The vehicle occupant apparatus of claim 29 wherein the polyhydroxyalkanoate resin is poly(3-hydroxybutyrate-co-3-hydroxyvalerate).

31. The vehicle occupant protection apparatus of claim 29 wherein the biodegradable fabric has a Mullen burst strength of at least about 1500 psi and an elastic modulus of about 10,000 psi to about 400,000 psi.

32. A vehicle occupant protection apparatus comprising a reaction canister wherein the reaction canister is biodegradable and comprises a polyhydroxyalkanoate resin.

33. The vehicle occupant protection apparatus of claim 32 wherein the polyhydroxyalkanoate resin is a homopolymer or copolymer of hydroxyalkanoate monomer units selected from the group consisting of 3-hydroxybutyrate, 3-hydroxyvalerate, 3-hydroxyoctanoate, 4-hydroxybutyrate, 5 5-hydroxyvalerate, 5-hydroxycaproate, 6-hydroxycaproate, 6-hydroxycaprylate, and 6-hydroxypropionate.

34. The vehicle occupant protection apparatus of claim 32 wherein the reaction canister further comprises a biodegradable fiber that reinforces the polyhydroxyalkanoate resin.

35. The vehicle occupant protection apparatus of claim 32 wherein the reaction canister is made from a composite, the composite comprising a continuous matrix of the polyhydroxyalkanoate resin reinforced with a biodegradable fiber.

36. The vehicle occupant protection apparatus of claim 34 wherein the biodegradable fiber comprises a continuous fiber or a discontinuous fiber.

37. The vehicle occupant protection apparatus of claim 36 wherein the biodegradable fiber is one of a plurality of continuous fibers and the continuous fibers are woven together.

38. The vehicle occupant protection apparatus of claim 36 wherein the biodegradable fiber is one of a plurality of discontinuous fibers and the discontinuous fibers are bonded together to form a web.



39. The vehicle occupant protection apparatus of claim 34 wherein the biodegradable fiber is a natural fiber or a synthetic fiber.

40. The vehicle occupant apparatus of claim 34 wherein the polyhydroxyalkanoate resin is a poly(3-hydroxybutyrate).

41. The vehicle occupant apparatus of claim 40 wherein the biodegradable fiber is cotton.

42. A vehicle occupant protection apparatus comprising a vehicle occupant protection device wherein the vehicle occupant protection device is biodegradable and comprises a polyhydroxyalkanoate resin.

43. The vehicle occupant protection apparatus of claim 42 wherein the polyhydroxyalkanoate resin is in the form of polyhydroxyalkanoate fibers.

44. The vehicle occupant apparatus of claim 43 wherein the polyhydroxyalkanoate fibers are woven or bonded together to form a biodegradable fabric.

45. The vehicle occupant apparatus of claim 43 wherein the polyhydroxyalkanoate resin is poly(3-hydroxybutyrate-co-3-hydroxyvalerate).

46. The vehicle occupant protection apparatus of claim 43 wherein the biodegradable fabric has a Mullen burst strength of at least about 1500 psi and an elastic modulus of about 10,000 psi to about 400,000 psi.

2025-03-24 10:00